REMARKS

Favorable reconsideration of this application is respectfully requested.

The Title is amended by the present response to be more clearly directed to the claimed invention.

Claims 7-9 are pending in this application. Claims 3-6 are canceled by the present response without prejudice. Claims 1 and 2 were previously canceled without prejudice. Claims 3-6 were rejected under 35 U.S.C. § 112, first paragraph. Claims 3-6 were rejected under 35 U.S.C. § 112, second paragraph. Claims 3-6 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. patent 5,328,855 to Kitabatake et al. (herein "Kitabatake") or U.S. patent 5,670,788 to Geis.

Addressing first the rejections of Claims 3-6 under 35 U.S.C. § 112, first and second paragraphs, those rejections are traversed by the present response.

Claims 3-6 are canceled by the present response and new Claims 7-9 are presented for examination. New Claims 7-9 are written to avoid the language found unclear in original Claims 3-6. More specifically, new Claims 7-9 do not recite the terms "under conditions", "high quality", or "few".

Addressing now the rejection of Claims 3-6 under 35 U.S.C. § 103(a) as unpatentable over Kitabatake or Geis, those rejections are traversed by the present response.

New Claims 7-9 are believed to clearly distinguish over the applied art.

As clear from new claim 7, in the claimed method for the fabrication of a diamond semiconductor, the thin diamond film layer is formed at a methane gas-to-hydrogen gas concentration of 0.016 to 2% to have a quality high enough to emit ultraviolet light at room temperature by excitation using electron beam irradiation when it has a thickness of not less than 200 nm.[1]

[1] See, for example, the present specification at page 5, line 11et seq., and page 5, last paragraph.

The high-quality thin diamond film layer is implanted, while being heated, with ions of dopant elements in an amount less than the maximum amount that varies depending on the temperature at which the thin diamond film layer is maintained without being graphitized. As a result, the diamond semiconductor fabricated according to the claimed invention exhibits conductivity determined by the kind and concentration of the dopant elements.

When ions of an element serving as an n-dopant are implanted into the high-quality thin diamond film layer of the claimed invention, electrons are emitted and move with ease because the layer has few impurities and few crystal defects. That is a conceivable reason why the semiconductor can have n-type conductivity. When ions of an element serving as a p-type dopant are implanted into the high-quality thin diamond film layer of the claimed invention, holes are emitted with ease and the emitted holes move smoothly because the layer has few impurities and few crystal defects. That is a conceivable reason why the semiconductor device can have p-conductivity.

Kitabatake discloses a diamond semiconductor generally described at column 1, lines 7-13, with an ion implantation described at column 2, lines 3-4, and having an ion energy of not less than 50 eV, noted at column 2, lines 52-53. Also, Geis discloses an ion energy of not less than 50 keV noted in the Office Action at column 3, lines 28-46.

However, applicants submit the claimed invention distinguishes over the teachings of both Kitabatake and Geis. The claimed invention is directed to the fabrication of a diamond semiconductor that has a high-quality thin film layer implanted, while being heated, with ions of dopant elements in an amount less than the maximum amount varying depending on the temperature at which the thin diamond film layer is maintained, without being graphitized, and that exhibits conductivity determined by the kind and concentration of the dopant elements. The specific parameters achieving such results are clarified in new claims 7-9.

As a result, even when the ion implantation energy in the claimed invention falls within the ranges disclosed in the cited art to Kitabatake and Geis, it is clear that it is not possible for one of ordinary skill in the art to fabricate a diamond semiconductor exhibiting electric conductivity (n-type or p-type) corresponding to that of the dopant elements implanted, insofar as both Kitabatake and Geis fail to disclose or suggest both the quality of the thin diamond film layer implanted with ions and the amount of the ions implanted, which varies depending on the layer-maintaining temperature, without inducing graphitization.

In such ways, each of new claims 7-9 is believed to clearly distinguish over the applied art.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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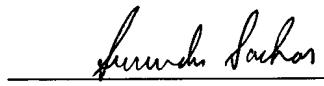

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